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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/659,593

09/10/2003

Back-Woon Lee

YOM-0057

5378

7590

06/20/2006

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Bloomfield, CT 06002

EXAMINER

GOKHALE, SAMEER K

ART UNIT

PAPER NUMBER

2629

DATE MAILED: 06/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/659,593	Applicant(s) LEE, BAEK-WOON	
	Examiner Sameer K. Gokhale	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7-18 and 33 is/are pending in the application.
- 4a) Of the above claim(s) 4-6, 19-32, 34 and 35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-14, 18 and 33 is/are rejected.
- 7) ☒ Claim(s) 15-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-3, 7-18, and 33 in the reply filed on April 10, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

2. Claim 16 is objected to because of the following informalities: Lines 5-6 of the claim recite, " $G' = G_{\text{sub.0}} + (255 - \text{Max}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))$ "; and " $G' = G_{\text{sub.0}} + (255 - \text{Max}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))$ " where the repeated G' equations appears to be in error. Appropriate correction is required.

In light of the above claim objection, the following analysis of the claims is based on the claims as best understood by the examiner.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "at least one portion of the gate lines and the data lines located adjacent to the white pixel having a width larger than other portions of the gate lines and the data lines", as recited in claim 10, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it

pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 18 recites the limitation, "wherein the data output unit outputs the optimized image signals by group of three optimized image signals". The enablement of this limitation is questioned because there is nothing in the specification showing how the data optimizer outputs the image signals in groups of three image signals, where all the embodiments show image signals output in groups of four (Ro', Go', Bo', Wo', as shown on Fig.1, Fig. 7, and Fig. 9). The written description does not provide clarification on how the data optimizer outputs the image signals in groups of only three image signals.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 10-12, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 10-12, the phrase "wherein at least one portion of the gate lines and the data lines located adjacent to the white pixel has a width larger than other portions of the gate lines and the data lines" on lines 1-3 of claim 10, renders the claim indefinite because (1) it is unclear what is meant by "at least one portion of the gate lines and the data lines", because that could mean we are considering a portion of the gate lines OR a portion of the data lines, or it could mean we are considering a portion on both the gate lines and the data lines. (2) It is unclear what is meant by "adjacent" because there are gate lines and data lines that are attached to the pixel itself, and then

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there are unattached gate lines and data lines that might also be considered "adjacent".

(3) It is also unclear what is meant by "width" because the width could be referring to actual wire width or the spacing between lines. (4) It is unclear what is meant by "other portions of the gate lines and the data lines" because without clarity in (1), this phrase is similarly unclear.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 13 and 33 are is rejected under 35 U.S.C. 102(b) as being anticipated by Tanioka (US 5,929,843).

Regarding claims 13 and 33, Tanioka teaches a device and method of driving a four color liquid crystal display (see abstract 1-7) including a plurality of dots (Fig. 2, where 51 is a dot), each dot including red, green, blue, and white pixels (Fig. 2), a plurality of gate lines for transmitting gate signals to the pixels (Fig. 7, driver 49 drives the gate lines), and a plurality of data lines for transmitting data signals to the pixels (Fig. 7, driver 47 drives the data lines), the device comprising: a gate driver (Fig. 7, driver 49) supplying the gate signals to the gate lines; a data driver (Fig. 7, driver 47) supplying the data voltages to the data lines; and an image signal modifier (Fig. 1) for converting three-color image signals into four-color image signals (Fig. 1 shows a 3-

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color signal being converted into a 4-color signal at lines 8), optimizing the four-color image signals (the pseudo-half-tone processor 14-1 to 14-3 optimizes the 4-color signal), and supplying the optimized image signals to the data driver such that the data driver converts the optimized image signals to the data voltages (Fig. 1, where R", G", B", and W" are the optimized signals and as seen in Fig. 7, these signals are supplied to the display device and the data driver).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutomu (JP 2001-296523) in view of Hashimoto (5,619,225).

Regarding claim 1, Tsutomu teaches a four color liquid crystal display comprising: a plurality of pixels including three primary color pixels and a white pixel (Fig. 1), each pixel including a pixel electrode and a switching element; a plurality of gate lines extending in a row direction for transmitting a gate signal to the pixels (Fig. 7 shows the gate lines extending in a row direction); and a plurality of data lines extending in a column direction for transmitting data signals to the pixels (Fig. 7 shows the data

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lines extending in a column direction), wherein the white pixel is smaller than the three primary color pixels (Fig. 1). However, Tsutomu does not explicitly teach each pixel including a pixel electrode and a switching element.

However, Hashimoto does teach a liquid crystal display where each pixel includes a pixel electrode (Fig. 1(a), electrode 12) and a switching element (Fig. 1(a), switch 11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Hashimoto in the display of Tsutomu in order to provide a well-known method of activating the pixel when it is being addressed.

Regarding claim 2, Tsutomu further teaches a display wherein the three primary color pixels include red, green and blue pixels (Fig. 1).

Regarding claim 3, Tsutomu further teaches a display wherein the green pixel is spaced apart from the white pixel (Fig. 1).

Regarding claim 7, Tsutomu further teaches a display wherein the pixels are arranged in sequence along the row direction (Fig. 1).

Regarding claim 8, Tsutomu further teaches a display wherein the three primary color pixels include red, green and blue pixels and the red pixel, the green pixel, the blue pixel, and the white pixel are arranged in sequence (Fig. 1).

Regarding claim 9, Tsutomu further teaches a display wherein the three primary color pixels have substantially equal size (Fig. 1).

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanioka in view of Morita (US 20020196243).

Regarding claim 14, Tanioka teaches a device wherein the image signal modifier comprises: a data converter converting three-color image signals into four-color image signals (Fig. 1, the section comprising 13-1, 13-2, 13-3, and 11 is a data converter); a data optimizer optimizing the four-color image signals from the data converter (14-1 to 14-4 is the data optimizer); a data output unit supplying the optimized image signals to the data driver (Fig. 7, display controller 44 performs this function).

However, Tanioka does not teach supplying the image signals to the data driver in synchronization with a clock; and a clock generator generating the clock, the data driver operating in synchronization with the clock.

However, Morita does teach a liquid crystal display where supplying the image signals to the data driver is in synchronization with a clock (see para. 239); and a clock generator generating the clock (see para. 239, where there is a control signal

generation circuit 74 providing the clock), the data driver operating in synchronization with the clock (para. 239).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Morita in the device of Tanioka in order to have a device where the data driver received image signal at the same rate it output data signals to the display.

Allowable Subject Matter

13. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Relative to dependent claim 15, the major difference between the prior art of record (Tsutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $W' = \text{Min}(W.\text{sub}.0, 255)$; $R' = R.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$; $G' = G.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$; and $B' = B.\text{sub}.0 + \text{Max}(0, W.\text{sub}.0 - 255)$.

Regarding dependent claim 16, the major difference between the prior art of record (Tsutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $G' = G.\text{sub}.0 + (255 - \text{Max}(R.\text{sub}.0, G.\text{sub}.0, B.\text{sub}.0))$; and $B' = B.\text{sub}.0 + (255 - \text{Max}(R.\text{sub}.0, G.\text{sub}.0, B.\text{sub}.0))$, (**Note the claim

objection above regarding this claim. The preceding analysis using "B" and "B.sub.0" was how the claim was best understood to be intended by the applicant).

Relative to dependent claim 17, the major difference between the prior art of record (Tsutomu, Tanioka) and the instant invention, is that the prior art does not teach optimized image signals determined by: $W' = (W_{\text{sub.0}} + \text{Average}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))/2$; $R' = R_{\text{sub.0}} + (W_{\text{sub.0}} - \text{Average}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))/2$; $G' = G_{\text{sub.0}} + (W_{\text{sub.0}} - \text{Average}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))/2$; and $B' = B_{\text{sub.0}} + (W_{\text{sub.0}} - \text{Average}(R_{\text{sub.0}}, G_{\text{sub.0}}, B_{\text{sub.0}}))/2$.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Miller et al. (US 20040178973) teaches a display using 4 pixels. Primerano et al. (US 6,885,380) teaches a method of converting from a 3-color image signal to a 4-color image signal. Murdoch et al. (US 6,897,876) teaches a method of converting from a 3-color image signal to a 4-color image signal. Kurizman (US 20020122160) teaches a method of calculating a 4-color image signal. Brown Elliot et al. (US 20030034992) teaches a method of converting from one sub-pixel format to another.

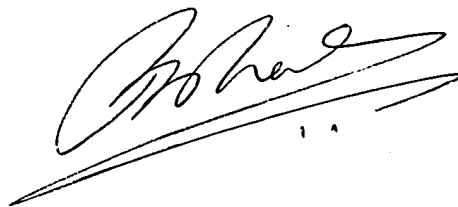
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sameer K. Gokhale whose telephone number is (571) 272-5553. The examiner can normally be reached on M-F 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on (571) 272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SKG
June 15, 2006

Sameer Gokhale
Examiner
Art Unit 2629

A handwritten signature in black ink, appearing to read 'Bipin Shalwala', with a long horizontal flourish extending to the left.

BIPIN SHALWALA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600